PITTWATER NATURAL HERITAGE ASSOCIATION INC.

Protecting Pittwater's Environment

Submission to NSW Department of Planning and Environment

Improving Biodiversity Outcomes in the Ingleside Precinct

Pittwater Natural Heritage Association February 2017
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Contents

Executive Summary

Pittwater Natural Heritage Association (PNHA) has engaged in the consultation process from the commencement of the Precinct Planning Process in 2013. This paper is our response to the release of the Draft Land Use and Infrastructure Strategy by the NSW Department of Planning and Environment.

The Ingleside Precinct is an unusual and challenging site for urban development. It is surrounded by national parks and nature reserves, contains many endangered species of fauna, flora and vegetation communities in the remnant native vegetation within the precinct and is the source area of many watercourses. As such, it requires special environmental protection.

PNHA has focused on fauna connectivity, protection of native vegetation and watercourses within the precinct.

Effective fauna connectivity between Ku-ring-gai Chase National Park, Garigal National Park and nature reserves to the east of the precinct is critical for survival of native fauna in and around the precinct. This has to be considered at the same time as planning to widen Mona Vale Rd is underway as otherwise connectivity through the wider area will not occur.

- We maintain that corridors of less than 100 metres minimum width, with cycle/walking paths, bushfire asset protection zones and water management areas situated in them will not be effective.
- There should be proper fauna road crossings (box culverts or better) within corridors
- Some corridors need to be extended to make effective links with reserves and national parks.

We acknowledge work by both NSW Roads and Maritime Services and the Department of Planning and Environment to improve fauna connectivity throughout the precinct

Native vegetation within the precinct is a resource that should be protected as much as possible.

- Use of E2 Environmental Conservation zoning is the most important tool for protection of Biodiversity within the precinct.
- Coastal Upland Swamps should be protected with 60 metre buffer zones.
- Katandra Bushland Sanctuary needs to be protected by a 10 metre wide vegetated buffer zone on its western boundary.

Watercourses are a natural feature of the Ingleside precinct which currently suffer from weed invasion, clearing of riparian zones, and sedimentation. Development of the precinct should be an opportunity to reverse this degradation.

- Cicada Glen Creek needs a riparian zone extending to its source within the Baha'i Temple precinct and the riparian zone north of Cicada Glen Rd needs to be wider.
- Cicada Glen Creek must be protected from overflows from the sewage pumping station in its catchment.

In this submission PNHA has also expressed the view that shortcomings in the documents on exhibition and the way they have been made available make it difficult for detailed analysis of the precinct planning proposal.

We ask that modifications to the precinct plan be made in accordance with our recommendations and that the modified plan be subject to a further non-statutory exhibition period.

Recommendations

PNHA makes the following recommendations for changes to the precinct plan:

1. Asset protection zones not be considered part of ecological corridors and be situated outside them.

2. Water Management Areas be situated outside riparian zones and fauna corridors

3. Minimum width of fauna corridors be 100 metres

4. Cycling and walking paths be constructed outside fauna corridors

5. The pipe culvert within corridor 4 on Minkara Road be converted to a larger box culvert

6. A fauna underpass be constructed on Cabbage Tree Road and fencing installed to improve the function of corridor 4.

7. Corridor 5 (see figure 5) be linked to Katandra Bushland Sanctuary to provide a corridor between it and Ingleside Chase Reserve.

8. Corridor 6 (see figure 6) be extended to make an effective link between Ingleside Chase Reserve and Garigal National park.

9. The eastern end of corridor 7 be linked to Ingleside Chase Reserve with a 100metre wide corridor, replacing the two narrow arms currently proposed.

10. A box culvert for fauna passage be constructed on Powderworks Road in corridor 8.

11. An agreement for fauna friendly design of Monash Golf Couse be obtained to improve the function of corridors 7 and 8.

12. All coastal upland swamps within the precinct be protected with 60 metre wide vegetated buffer zones.

13. The bushland area on the eastern side of Cicada Glen Creek, which fronts Cicada Glen Road be preserved as an urban forest. This land should be zoned E3, Environmental Management and biobanked to provide biodiversity offsets within the Ingleside Precinct.

14. A 10 metre vegetated buffer zone be created along the western boundary of Katandra Bushland Sanctuary.

15. That the source of Cicada Glen Creek be protected with a buffer zone and that the riparian corridor on Cicada Glen Creek be extended to this water source and the creek channel restored. All water management works should be situated outside this riparian corridor.

16. The riparian zone on Reach A of Cicada Glen Creek be 50 metres either side of the channel.

17. An assurance be obtained from Sydney Water that any sewage overflows that may occur within the precinct will be prevented from entering watercourses.

18. That dams on watercourses within the precinct be removed

19. Hard copies of planning documents be made available on request to members of the Ingleside Community Reference Group

20. A further non-statutory exhibition period be provided to enable on-going community consultation.

1. Introduction

1.1 Background

As the footprint of Sydney expands into its outer bushland fringes, habitat destruction and fragmentation of bushland take a huge toll on biodiversity. The Ingleside precinct is especially problematic in this regard. Eco Logical Australia (2016) lists two Endangered Ecological Communities within the precinct along with 24 threatened fauna species and 13 threatened flora species predicted to be present within the precinct. Other researchers and volunteers have located many of these within and around the precinct, including the Powerful Owl, Giant Burrowing Frog, Eastern Pygmy Possum, Rosenberg's Goanna and Little Eagle.

Pittwater Natural Heritage Association (PNHA) has been taking an active part in the planning process for Ingleside since being appointed to the Community Reference Group in 2013. In our many submissions and other contributions to the planning process we have employed our knowledge of local and regional environmental issues to provide positive input aimed at improving environmental outcomes in and around the Ingleside precinct.

We acknowledge the changes and refinements to the biodiversity outcomes made by The Department of Planning and Environment (DP&E) and Northern Beaches Council in response to lobbying by PNHA and consultation with the community but we believe that there is much more to do and we only have one chance to get it right.

1.2 Scope of this submission

Among the many issues associated with the Ingleside Precinct Planning Process, Pittwater Natural Heritage Association have identified three key ecological issues to address in this submission. They are: Fauna Connectivity, Protection of Native Vegetation and Precinct Watercourses. We also comment on the quality of the documents provided for consultation.

2. Fauna Connectivity

The Ingleside precinct is surrounded by national parks and nature reserves, the most significant being Ku-ring-gai Chase National Park on the north western boundaries of the precinct. To the south is Garigal National Park and to the east are three reserves: Minkara Reserve, Katandra Bushland Sanctuary and Ingleside Chase Reserve. Long term persistence of native fauna in Garigal National Park and these reserves is dependent on connection with the genetic pool provided by Ku-ring-gai National Park. There is also a need to enable easterly movement of native fauna in the event of a bushfire approaching the precinct from the west as has happened many times in the past, the most recent being in 1994.

Currently the existing fragments of native vegetation and low density development allow fauna movement through the precinct to the reserves to the east. With the development of the Ingleside precinct there needs to be a number of effective corridors through the precinct and proper crossings on Mona Vale Road and internal roads.

2.1 Connectivity across Mona Vale Road

Mona Vale Road in its current two lane form is an impediment to fauna connectivity as evidenced by the numbers of roadkill recorded by volunteers, and noted by SMEC (2011). However, without the installation of fauna crossing structures the proposed upgrade to four lanes would cause it to become an impermeable barrier to fauna movement and genetic exchange.

In response to discussions with representatives from PNHA and others, Roads and Maritime Services (RMS) have investigated locations and structure types which will enable fauna connectivity across the upgraded Mona Vale Road.

On Mona Vale Road west RMS will build a vegetated fauna bridge to the East of Kimbriki Road (Figure 1, A), an underpass to the west of Tumburra Street (Figure 1, B) and an underpass on the extension of Harvey Road in the Wirreanda Valley (Figure 1, C).

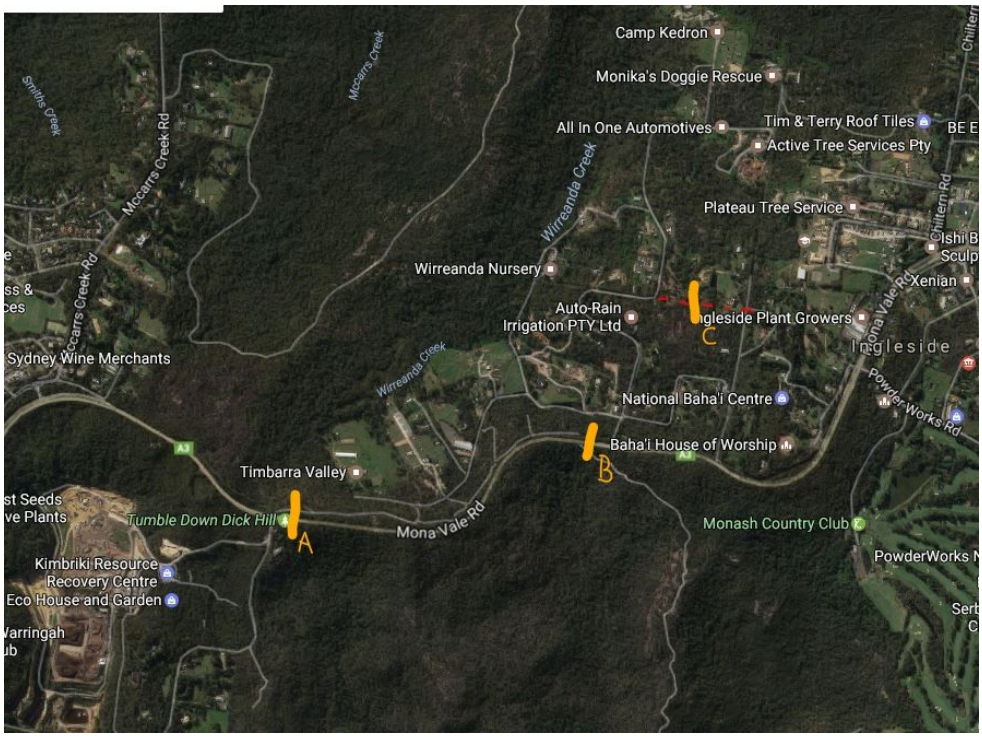

Figure 1 Approximate locations of fauna crossings on Mona Vale Rd West

On Mona Vale Road east the proposed fauna crossing structures are: a fauna underpass (culvert) in the vicinity of Ingleside Road East (Figure 2, A), a small vegetated fauna bridge to the south of Narrabeen Creek (Figure 2, B) and a box culvert on Narrabeen Creek (Figure 2, C).

Figure 2 Approximate locations of fauna crossings on Mona Vale Rd East

In addition RMS will erect fencing in strategic locations along Mona Vale Road to guide native fauna to the crossing structures.

This is consistent with the Fauna Strategy developed jointly by DP&E, RMS and others. We commend the RMS project management team for the quality of their solution to the Mona Vale Road fauna connectivity problem.

2.2 Effectiveness of corridors within the precinct

A number of factors affect the effectiveness of fauna corridors: width, vegetation type, type of structures used for road fauna crossings for example. Factors affecting the effectiveness of fauna corridors through the Ingleside Precinct are listed below.

2.2.1 Zoning of corridor land

In order to provide the best possible conservation of biodiversity, most fauna corridors shown in the plan are to be zoned E2 Environmental Conservation, which would ensure retention and protection of native vegetation. However parts of some will be zoned E3 Environmental Management, which reduces their effectiveness as fauna corridors.

2.2.2 Asset protection Zones

Asset protection zones by their nature have limited tree canopy and sparse understorey, which reduces their function as habitat for many species and therefore degrades their value as fauna corridors. Given this, we make the following recommendation.

Recommendation 1: That asset protection zones not be considered part of ecological corridors and be situated outside them.

2.2.3 Water Management Areas

The Bushfire Protection Assessment states “Water Management Areas are likely to range from cleared land with mown grass or rocks to planted wetland species less than 1 m in height with the occasional scattered trees. As such, they have been conservatively treated as ‘low hazard’ for the purpose of this report”. (Eco Logical 2016, p8). The lack of native vegetation in such areas makes them unsuitable for fauna corridors.

Recommendation 2: That water management areas be situated outside riparian zones and fauna corridors.

2.2.4 Fauna Underpasses

Some existing culverts in the precinct do not allow fauna movement so are considered unsuitable for fauna corridors. Figure 3 is an example of a pipe culvert that is unsuitable as a fauna underpass. The pipes are less than 1 metre in diameter, are continually flooded, and without a flat floor pipe culverts generally are not suitable. Box culverts with flat dry floors are the recommended structure for fauna underpasses.

Figure 3 Pipe Culvert on Cicada Glen Road

2.2.5 Width of corridors

Width of corridors is discussed in a previous submission made by Pittwater Natural Heritage Association (Marlow and Palmer, 2015). Narrow corridors suffer from edge effects such as light spill, predation from cats and dogs and weed invasion.

Recommendation 3: Minimum width of fauna corridors be 100 metres.

2.2.6 Cycle/walking paths

Cycling and walking paths within ecological corridors introduce a hard surface, reduce cover and facilitate the entry of predatory animals.

Recommendation 4: To limit the disturbance to native fauna, cycling and walking paths should be located beside fauna corridors, not within them

2.3 Fauna connectivity through the Ingleside Precinct

The Ecological corridor map in the Draft Land Use and Infrastructure Strategy shows a number of lineal green links within the precinct. In our view the effectiveness of these corridors varies due to a number of reasons which are detailed below with reference to Figure 4, from the Ingleside Precinct Draft Biodiversity Assessment Report (Eco Logical, 2016). In the following section, each corridor is evaluated for its effectiveness.

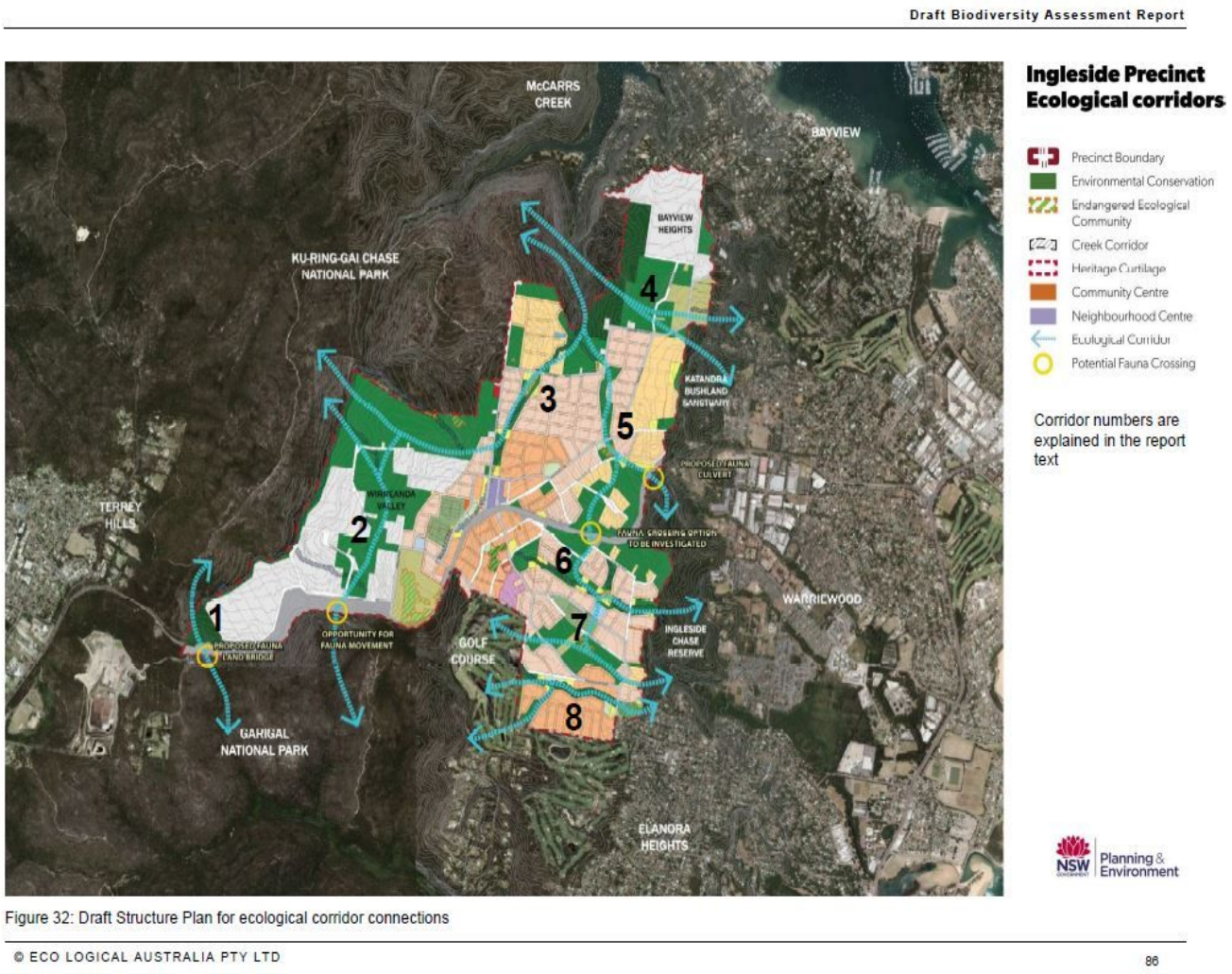

Figure 4 Ecological Corridors Numbered

Corridor 1

We believe that the vegetated fauna overpass at this site will create a highly effective link between Ku-ring-gai Chase National Park and Garigal National Park.

Corridor 2

This corridor also links Ku-ring-gai chase National Park with Garigal National Park. It is generally wide and with the construction by RMS of fauna underpasses on Mona Vale Road and the Harvey Road extension (not shown in Figure 4) the movement of many native species between the national parks will be facilitated. However its function is hampered by a pinch point. We feel that its effectiveness would be improved by making the minimum width 100 metres.

The existing 1.2 metre diameter pipe culvert on McCowen Road through which water flows in all but the driest conditions, would only be utilised as a crossing by a small range of species. However light traffic conditions, especially at night and density of surrounding native vegetation will ensure roadkill is minimised in the Wirreanda Valley Sub-precinct at the current level of residential development. This corridor will also provide an important link to the Endangered Ecological Community within the Baha'i Temple precinct

Corridor 3

While this riparian linear green zone is listed as a fauna corridor, PNHA doesn't believe that it will function as such as it does not connect Ku-ring-gai Chase National Park with any other nature reserve or national park. In addition it will be employed for a number of other competing uses, such as an off road shared cycle/walking path and water management structures.

The existing 4x 900 mm pipe culvert on Cicada Glen Road (Figure 3) is half full of water and too small to function as a fauna underpass.

Although it will have a number of positive outcomes for water quality, recreation and active travel through the precinct, in our view it is not "broadly consistent with the recommended wildlife corridors" as stated by Eco Logical (2016)

Corridor 4

Corridor 4 appears intended to link Minkara Reserve and Katandra Bushland Sanctuary with Ku-ring-gai Chase National Park, but in our view it has a number of shortcomings.

The E3 Environmental Management zone around Cabbage Tree, Minkara and Walter Roads will allow a certain amount of permeability, however Minkara and Cabbage Tree Roads are quite busy now and will carry much more traffic after residential development in Ingleside. Therefore to reduce roadkill and improve the function of the corridor improvements need to be made to enable fauna to cross Minkara and Cabbage Tree Roads.

Recommendation 5: The existing 1.1 metre diameter pipe culvert on Minkara Road be converted to a larger box culvert

Recommendation 6: An underpass and fauna fencing be constructed on Cabbage Tree Road.

Corridor 5

We consider this to be one of the core corridors in the precinct and the main link between Ingleside Chase Reserve and Ku-ring-gai Chase National Park. RMS have acknowledged the importance of this link by committing to the construction of a vegetated overpass south of Narrabeen Creek and an underpass east of Ingleside Road. As a core corridor it must have a minimum width of 100 metres

In our view the above commitment by RMS emphasises the need for this corridor to complement the fauna crossings on Mona Vale Road with effective fauna underpasses on Boronia Road, Lane Cove Road and Cicada Glen Road.

We note that the Ingleside Transport Study (2016) shows an off road shared path through this corridor. This path must be constructed outside the corridor.

The benefits of this corridor would be enhanced if it were linked with Katandra Bushland Sanctuary as shown in Figure 3. At present the only fauna corridor linking Katandra to Ku-ring-gai Chase National Parkis corridor 4, which we consider to be less than ideal. In any case one corridor to this important reserve is not sufficient, and it needs to be linked to Ingleside Chase Reserve.

Recommendation 7: That a vegetated corridor be created between Katandra Bushland Sanctuary and Corridor 5.

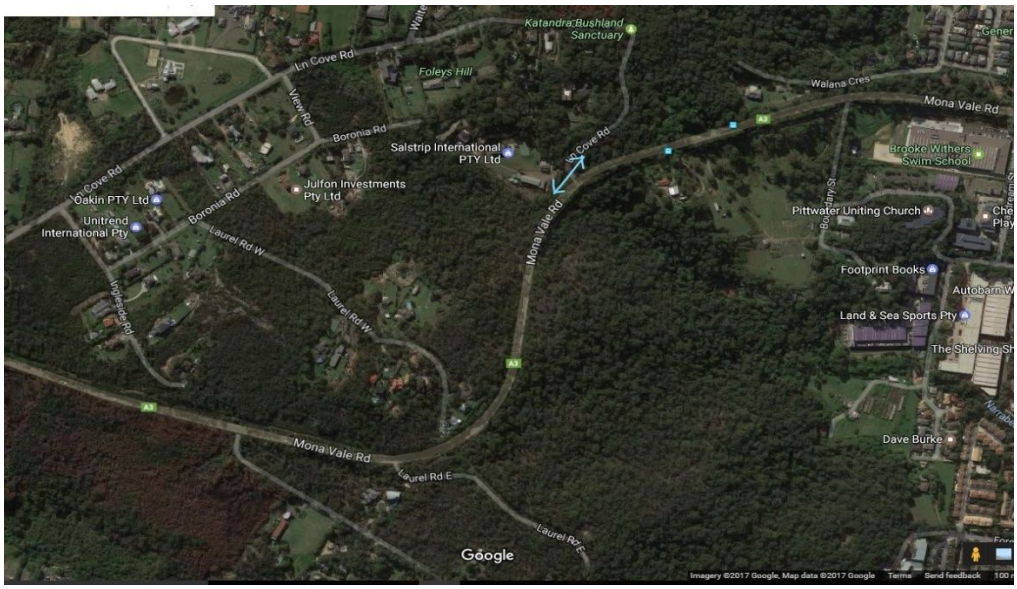

Figure 5 Vegetated link required between Corridor 5 and Katandra (Blue arrow)

Corridor 6

Corridor 6 extends into the Ingleside precinct along the north arm of Mullet Creek. We note that Eco Logical Australia states (p 85) that "it does not extend as far west as the recommended wildlife corridor." This corridor should be extended to link with the Coastal Upland Swamp to the north and what we consider to be a related upland swamp/wet heath area to the north-west between Waratah and Mona Vale Roads then on to link with Garigal National Park.

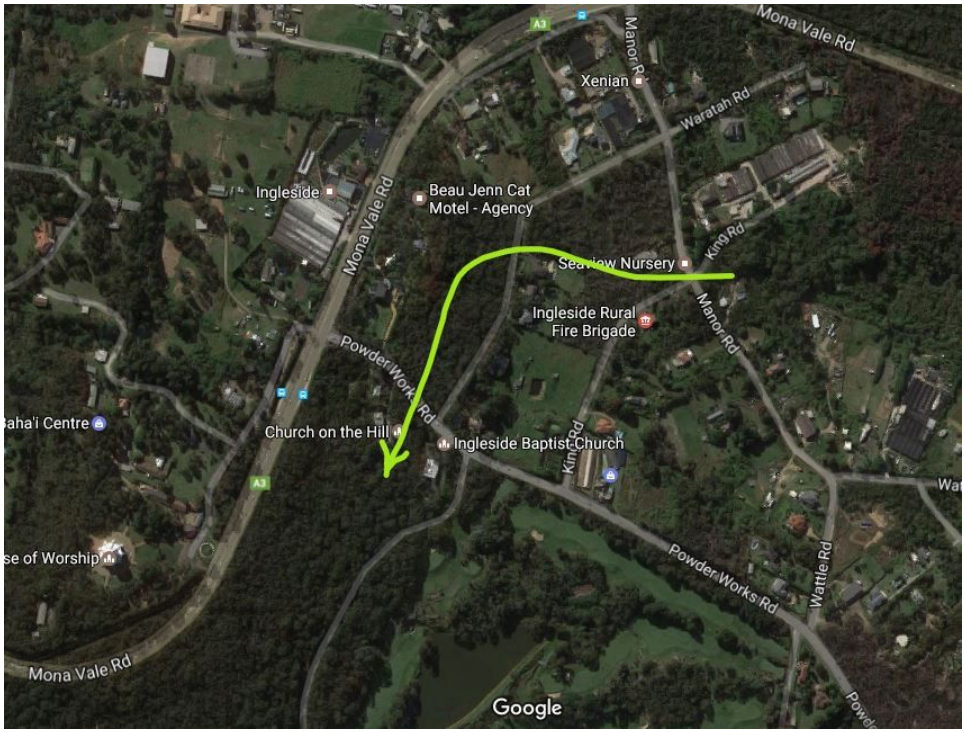

Figure 6. Extension of Corridor 6 to link with Garigal National Park

The importance of preserving coastal upland swamps and buffer zones around them is discussed below, but it needs to be emphasised here that in addition to creating a valuable fauna corridor this is an opportunity to improve the protection of endangered ecological communities, the hydrological balance of this important water source and the water quality in Mullet Creek.

Recommendation 8: That corridor 6 be extended to make an effective fauna link between Ingleside Chase reserve and Garigal National Park

Corridor 7

Corridor 7 has a number of limitations: Monash Golf Course sits at its western end, and the eastern end with two arms 26 metres and 29 metres wide it becomes too narrow to function effectively due to edge effects. These include weed invasion (already evident) and predation by domestic and feral cats and dogs. The proposed underpasses on Ingleside and Powderworks Roads will be critical for its effectiveness. As it contains valuable heathland and is a known habitat of the Eastern Pygmy Possum (an endangered species) we believe it must be effectively linked to Ingleside Chase reserve.

Recommendation 9: That the two narrow arms at the eastern end of corridor 7 as shown in the Draft Structure Plan for ecological corridors (see figure 4) be replaced by a single corridor of at least 100 metres in width.

Corridor 8

This corridor forms a valuable link as far as Monash Golf Course and includes a pipe culvert at the eastern end under Powderworks Road (Figure 7). Installation of a box culvert at this site would improve its function as a fauna underpass.

Recommendation 10: That a box culvert fauna underpass be constructed on Powderworks Road in corridor 8

Figure 7 Culvert on Mullet Creek, under Powderworks Road

We also note that water management areas are located outside the riparian zone. However the location of Monash Golf Course in relation to this and Corridor 7 needs to be addressed. We would like to see agreement by Monash Golf Course to investigate how to enhance its property eg “fauna friendly design” so as to allow free passage of native species through to Garigal National Park.

Recommendation 11: That an agreement for “fauna friendly” enhancements to its property be negotiated with Monash Golf Course so as to improve the effectiveness of corridors 7 and 8.

3. Protection of Native Vegetation

Within the 715 hectare Ingleside precinct 356 ha or 49.8% of the total area has been identified as native vegetation (Eco Logical, 2014). This is a valuable natural resource, for provision of habitat for native fauna, absorption of pollution and greenhouse gases, cooling and shade and for the Endangered Ecological Communities within such as Coastal Upland Swamps (CUPs).

3.1 Coastal upland swamps

Before rural subdivision of the Ingleside area, creeks in the area would have been charged by many CUPs. Some of these have been destroyed, however Eco Logical (2016) identifies seven CUPs within the precinct.

CUPs are listed as endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and under the NSW Threatened Species Conservation Act 1995. They contain a wide range of vegetation associated with periodically waterlogged soil and provide crucial water filtering services that benefit water quality in streams.

When the catchments of CUPs are subject to residential development the quality and quantity of urban runoff has a degrading effect due to elevated levels of nutrients and sediment and raised pH due to the buffering effect of concrete. Over time nutrients will increase to a level which start to damage the CUP and eventually destroy most of the native vegetation within them. They are also impacted by changes in hydrology and weed invasion.

Recognising these threats to CUPs, Blue Mountains City Council mapped upland swamps and zoned them as environmental protection, and after a 1997 study by Smith and Smith, a 60 metre buffer was incorporated around all mapped swamps within the Blue Mountains Local Government Area (Blue Mountains Environmental Management Plan 2002).

PNHA considers that the CUP bounded by Manor, King and Waratah Roads should protected with a 60 metre buffer all round. It should also be linked to the environmental conservation land at the head of Mullet Creek, north arm and that an area of native vegetation between Waratah, Powderworks and Mona Vale Roads which exhibits characteristics of a CUP. This native vegetation should be zoned Environmental Conservation so as to create a fauna corridor link to Garigal National Park.
All other CUPs within the Precinct should likewise be protected with a 60 metre buffer zone all round. This is consistent with their status as “red flag” areas in the Biodiversity Certification Assessment Methodology. OEH principles for the use of biodiversity offsets in NSW say that “Impacts must be avoided first by using prevention and mitigation measures” Protection with a 60 metre vegetated buffer zone around the CUPs within the precinct would help avoid impacts of residential development on CUPs.

Recommendation 12: All Coastal Upland Swamps within the precinct be protected with 60 metre wide vegetated buffer zones

3.2 Retention of urban forest

Increasing housing density, more roads and consequent loss of vegetation raise temperatures in a precinct creating a heat island. These effects will be exacerbated by climate change. Trees are a counter to the urban heat island effect. In addition trees within an urban precinct reduce energy demand for heating and cooling; improve air quality and sequester carbon.

Recent research has shown that living with urban nature (biophilic urbanism) provides multiple benefits, to residents including increased psychological wellbeing, reduced stress and developmental benefits to children (Reeve et al, 2013).

Incorporating as many bushland areas – urban forests- as possible within the precinct will enhance the natural values of the precinct.

One area within the precinct that should be preserved as an urban forest is that bushland area on the eastern side of Cicada Glen Creek, which fronts Cicada Glen Road (Figure 4).

Figure 8 Land suitable for E3 Environmental Management zoning

This area of forest has been studied by professional and volunteer ecologists who have recorded many significant native fauna species using it as habitat, including the following:

Micro bats species were recorded by Anabat on 2/5/2016 on this land by J Marlow and Dr B Law (2017). Note that those species marked with an asterisk are threatened species. *Myotis macropus* is a federally listed threatened species.

Species	Ingleside (Dam)	Ingleside (dam)
Chalinolobus dwyeri *	X	
Chalinolobus gouldii	X	X
Miniopterus australis *		X
Miniopteris schreibersi	X	X
Mormopterus norfolkensis *		X
Myotis macropus *	X	X
Scotorepens orion		X
Rhinolophus megaphyllus	X	X
Tadarida australia	X	X

Rosenberg's goanna was recorded at 3 Cicada Glen Rd Ingleside (Marlow, 2017):

- 10-30 am Sat 16 January 2016 size approximately 70 cm.
- 9-15 am and 2-00 pm Sun 7 February 2016, size approximately 45 cm.
- 11-30 am Sat 5 March 2016, size approximately 1 m.
- 1-45 pm Sun 6 March and 10 am Mon 7, size approximately 1 m.

A pair of adult **Glossy Black-Cockatoos** with their young, were recorded feeding on this site at various times: 2nd, 3rd, and 4th of March 2016 and the 14th and 30th of April 2016 and this area is also foraging territory for **Square Tailed Kites** (Marlow, 2017).

Recommendation 13: That this land should be zoned E3, Environmental Management and biobanked to provide biodiversity offsets within the Ingleside Precinct.

3.3 Creation of a vegetated buffer zone to protect Katandra Bushland Sanctuary

Katandra Bushland Sanctuary is situated on the escarpment bordering the eastern edge of the precinct. At present it suffers from weed infestation and polluted runoff from the properties above in what is currently RU2 zoned land (min. 20,000sq metre lots). With development of the precinct, land use above the sanctuary will be more intensive (min. 2000sqm metre lots), making the situation worse for Katandra. There is also the issue of visual protection of the land on top of the escarpment. At present most of the lots are not visible from the coastal plain due to the tree line at the top of the escarpment.

We note that some areas of the land on the edge of the escarpment will be zoned Environmental protection, but we believe that this is not enough for environmental or scenic protection. Creation of a 10 metre vegetated buffer zone along the western border of Katandra Bushland Sanctuary, between Mona Vale Road and Cabbage Tree Road, would protect both Katandra and the view of the top of the escarpment as seen from Mona Vale and other easterly viewpoints.

Recommendation 14: A 10 metre vegetated buffer zone be created along the western boundary of Katandra Bushland Sanctuary.

4. Precinct Watercourses

The Ingleside Precinct contains the headwaters of a number of creeks: Wirreanda, Cicada Glen, Narrabeen, and Mullet Creeks being the major watercourses within the precinct. Local receiving waters are Pittwater (McCarrs Creek and Winnererremy Bay), Warriewood Wetlands and Narrabeen Lagoon, which rely on a supply of clean, sediment free water.

Narrabeen lagoon was affected by siltation when residential development occurred in the Oxford Falls area, and residents living on McCarrs Creek Road report increased levels of silt in the estuary near where Cicada Glen Creek flows into it.

The riparian zones of these watercourses serve as filters of runoff and pollutants, a means of bank stabilisation and important habitat for fauna. In many cases they are charged by Coastal Upland Swamps and springs within their upper catchments. These must have the maximum possible protection. We believe that development of the Ingleside Precinct should have a neutral to beneficial effect on waterways within the precinct.

PNHA supports the general aim of the Riparian Corridors Assessment report (Eco Logical 2016), however we have some issues with investigation of some creeks within the precinct as discussed below.

We note a factual error in the report. The name Crystal Creek has been assigned to a branch of Wirreanda Creek, when in fact according to the Mona Vale Topographic Map Crystal Creek is a separate creek which is within the boundary of Ku-ring-gai Chase National Park and which flows into McCarrs Creek.

4.1 Cicada Glen Creek

PNHA disagrees with the suggestion (p13) that Reach T of Cicada Glen Creek could "be removed form riparian corridor requirements under the Water Management Act if Approved by DPI Water" as stated on p13 of the Riparian Corridors Assessment. We are disappointed to see that this suggestion has been acted upon as shown in the Ingleside Precinct Structure Plan.

Cicada Glen Creek emanates from a natural spring in the vicinity of the Baha'i Temple precinct, on land that was once Waratah Farm, an orchard owned by Isaac Larkin who is reported as saying "the natural springs and drains have done all the watering I've needed so far." There are also reports from the time of "naturally swampy land" (Pittwater Online News, 2016). It appears that no attempt has been made to investigate this.

We believe that instead of channelling Reach T of the creek through concrete structures and pipes, that it and its source should be rehabilitated so as to improve water quality in the creek and the amenity of this area of the precinct.

Chapter 1 Section 3 of the NSW Government Water Management Act 2000 states that the objects of this Act are to provide for the sustainable and integrated management of the

water sources of the State for the benefit of both present and future generations and, in particular:
(a) To apply the principles of ecologically sustainable development, and
(b) To protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality,

T*he NSW Groundwater Quality Protection Policy (Dept. Land & Water Conservation 1998)* states that:
"It is the policy of the NSW Government to encourage the ecologically sustainable management of the State's groundwater resources, so as to slow and halt, or reverse any degradation of groundwater resources."

The Urban Development Principles listed on p 30 of the Riparian Corridors Assessment Report support rehabilitation of Reach T.

Recommendation 15: That the source of Cicada Glen Creek be protected with a buffer zone and that the riparian corridor on Cicada Glen Creek be extended to this water source and the creek channel restored. All water management works should be situated outside this riparian corridor.

Reach A of Cicada Glen Creek is classified on page 16 of the Riparian Corridors Assessment as "Near Intact" and in Table5, page 27 is given a "High" conservation priority. Given this, the riparian zone shown does not appear to be wide enough.

Recommendation 16: That Reach A of Cicada Glen Creek be protected with a riparian zone of 50 metres either side of the channel.

We are also concerned about the proposal to construct a sewage pumping station in the riparian zone of Cicada Glen Creek. We are concerned that this may suffer overloads which discharge into the creek.

Recommendation 17: That Sydney Water give an assurance that any sewage overflows that may occur within the precinct will be prevented from entering watercourses.

4.2 Mullet Creek

As discussed in 3.1 above, the Coastal Upland Swamps and wet vegetation communities in the headwaters of Mullet Creek must be protected by buffer zones.

We agree with the suggestion in the Riparian Corridors Assessment (p29) that dams on Mullet Creek which affect the natural flow regime should be removed. We would add that this should apply to dams and weirs constructed on Cicada Glen, Wirreanda and other creeks within the precinct.

Recommendation 18: That dams on watercourses within the precinct be removed

5. Documents provided for consultation

In developing this submission we have been hampered by the poor quality of the documents provided for the consultation process.

Many of the maps are small (A4 size and smaller) and of such poor resolution that they are hard to read. The scale changes from map to map which makes it extremely difficult to do comparisons and overlays which are needed to assess the cumulative effects of various changes to the precinct. Also, it is difficult to use the on-line documents for detailed analysis and cross referencing.

The Draft Land Use and Infrastructure Strategy is short on detail and information which would enable the lay reader to understand the Precinct Structure Plan and the logical progression from investigation and research leading to its development.

Two examples of lack of detail are:

- Figures quoted under Development Outcomes on page 5 do not seem to reconcile with figures in the Land Use outcomes on page 6. We don't know how these figures are derived.

- Explanation of different land use zones is not adequate especially in regard to Environmental Conservation and Environmental Management zones. One assumes that they equate to E2 and E3 under the Pittwater Local Environment Plan 2014, but this is not stated in the document.

To assist with future community input complete sets of hard copy documents should be made available to any members of the Ingleside Community Reference Group who request them. Such documents should have A3 size maps all to the same scale and show the logical progression from the results of the various studies to the final subdivision.

Pittwater Council's Ingleside Warriewood Draft Planning Strategy, produced for the proposed Ingleside and Warriewood land release in the 1990s is set out in such a manner so would serve as a model.

Recommendation 19: That hard copies of planning documents be made available on request to members of the Ingleside Community Reference Group

We also feel that such a significant number of changes need to be made to the Precinct Plan that these need to be subject to further consultation with the community.

Recommendation 20: that a further non-statutory exhibition period be provided to enable on-going community consultation.

Summary

The location and biodiversity values of the Ingleside Precinct pose many challenges for its development as a residential suburb. Urban planning should be driven by the environmental constraints and opportunities to achieve a healthy, resilient and ecologically sustainable suburb.

Our assessment of fauna connectivity, protection of native vegetation and watercourses within the precinct proposed in the Draft Land Use and Infrastructure Strategy and supporting reports lead us to the conclude that while a number of worthwhile attempts have been made to improve ecological sustainability outcomes, there are still many improvements to be made.

Fauna connectivity
Ecological corridors need to be wide vegetated habitats for a wide range of fauna. It is of critical importance that reserves and national parks around the precinct are effectively connected. We maintain that corridors of less than 100 metres minimum width, with cycle/walking paths, bushfire asset protection zones and water management areas situated in them will not be effective. There should be proper fauna road crossings (box culverts or better) within corridors. Some corridors need to be properly extended to make effective links with reserves and national parks.

Native vegetation
Native vegetation should be protected using E2 Environmental protection zoning and Coastal Upland Swamps should be protected with 60 metre buffer zones.
Katandra Bushland Sanctuary is in danger of weed invasion and water pollution from the urban lots situated on its western boundary. It needs to be protected with a vegetated buffer zone of min 10 metres in width.

Watercourses
Water quality and riparian health of Cicada Glen Creek will be degraded under current proposals for narrow riparian zones, and in the case of its headwaters, no riparian zone, as well as a sewage pumping station in its catchment. Protection for this creek must be improved.

PNHA believes that the documents on exhibition hamper consultation and comment. It is also clear to us that a number of significant changes need to be made to the Draft Land use and Infrastructure Strategy. Therefore we request that the community consultation process be extended with a further non-statutory exhibition period of the amended documents.

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